TEST

PROCEDURES

[THIS PAGE INTENTIONALLY LEFT BLANK]

SAFETY WARNING

CHEMICALS

1. Prior training is mandatory before testing of chemicals. The inspector must have a thorough knowledge of safety and test procedures.

2. Before testing any chemical, read and thoroughly understand all safety warnings on the label.

3. If you are unsure, call a qualified official with the proper authority to give guidance before you begin testing.

MATERIAL SAFETY DATA SHEETS (MSDS)

MSDS are provided by the manufacturer of a product to identify the product's basic characteristics and hazardous information. MSDS typically provide information pertaining to the characteristics of a product such as hazardous ingredients, physical data, fire and explosion hazard information, fire hazard information, reactivity data, spill or leak procedures, special protection information, special precautions, toxicological information, and other relevant information. MSDS can be obtained from the manufacturer of the product. As new information is discovered concerning the properties of a product and the effects of various levels of exposure to it, MSDS can change. It is recommended that updated versions of the MSDS by obtained periodically to ensure that information is current. For further information on MSDS, contact your local OSHA office.

GENERAL TEST PROCEDURES

PACKAGES LABELED BY:	Page and/or Section Number
WEIGHT	
Drained Weight	HB 133, pg. 20, 2.5
Net Weight, Tare Procedure (Net Weight = Gross Weight - Tare Weight)	HB 133, pg. 14
LIQUID VOLUME	
Capacity Measure	HB 133, pg. 30, 3.6
Depth Gage (Titled “Other”)	HB 133, pg. 28, 3.4
Direct Measure	HB 133, pg. 28, 3.3
Displacement (Titled “Solids or Semisolids”)	HB 133, pg. 41, 3.12
Gravimetric, Weight of Known Volume	HB 133, pg. 24
Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
Pycnometer, Density Cup (Titled “Very Viscous Materials”)	HB 133, pg. 37. 3.9
LINEAR OR SQUARE (AREA MEASURE)	
Bidimensional Flat or Roll Commodities	QC Manual, 16-15
Bidimensional Irregular Commodities, Weight	QC Manual, 16-13
Bidimensional Irregular Commodities, Template	QC Manual, 16-14
Gravimetric	HB 133, pg. 62, 4.8
COUNT	
Labeled 51 or More Units per Package, Weight	HB 133, pg. 54, 4.3
Labeled 50 or Fewer Units per Package	HB 133, pg. 53, 4.2

[THIS PAGE INTENTIONALLY LEFT BLANK]

COMMODITY - TEST PROCEDURE INDEX

Product	Procedure(s)	Page and/or Section Number
Aluminum Foil	Bidimensional, Flat, Roll	QC Manual, 16-15
Animal Bedding	Animal Bedding	QC Manual, 16-9
Aerosol Commodities	Aerosol Packages	HB 133, pg. 13
Asphalt Patching Compound	Depth Gauge (Titled “Other”) Headspace (Titled “Mayonnaise”)	HB 133, pg. 28, 3.4 HB 133, pg. 29, 3.5
Baler Twine	Procedure for Length	HB 133, pg. 64, 4.9
Bandages, Elastic, Roll Type	Bidimensional, Flat, Roll	QC Manual, 16-15
Beer	Beer	QC Manual, 16-11
Blankets	Textiles	QC Manual, 16-41 HB133, pg. 62, 4.8
Borax	Borax	HB 133, pg. 19, 2.4
Bungee™ Cords	Direct Measure	QC Manual, 15-25
Butter	Net Weight	HB 133, pg. 14
Candles	Candles	QC Manual, 15-5
Carbonated Beverages, Nonalcoholic (inc. water)	Gravimetric Carbonated Beverages	HB 133, pg. 25, 3.2 QC Manual, 16-17
Caulking	Measure	HB 133, pg. 37, 3.9 QC Manual, 16-18
Chitterlings	Drained Weight, Frozen Foods	HB 133, pg. 21, 2.6
Coffee, Canned	Canned Coffee	HB 133, pg. 14
Compressed Gas, Cylinders	Compressed Gas	HB 133, pg. 46, 3.14
Cottage Cheese	Depth Gauge (Titled “Other”) Headspace (Titled “Mayonnaise”) Net Weight	HB 133, pg. 28, 3.4 HB 133, pg. 29, 3.5 HB 133, pg. 14
Crabmeat, Frozen	Drained Weight, Frozen Foods	HB 133, pg. 21, 2.6

Product	Procedure(s)	Page and/or Section Number
Detergents & Soaps, Liquid	Depth Gauge (Titled "Other")	HB 133, pg. 28, 3.4
	Headspace (Titled "Mayonnaise")	HB 133, pg. 29, 3.5
	Gravimetric	HB 133, pg. 25
Fertilizer	Net Weight	HB 133, pg. 14
Firewood	Firewood Bulk	HB 133, pg 51, 3.17 QC Manual 16-19
	Firewood, Boxed	HB 133, pg 50, 3.16 QC Manual 16-24
	Firewood, Bundles or Bagged	HB 133, pg 51, 3.18
Frozen Fish & Seafood	Glazed Raw Seafood & Fish	HB 133, pg. 22, 2.7
Shrimp, Frozen Block	Drained Weight, Frozen Food	HB 133, pg. 21, 2.6
Crab, Frozen Canned	Drained Weight, Frozen Food	HB 133, pg. 21, 2.6
Frozen Foods	Drained Weight of	HB 133, pg. 21, 2.6
Frozen Beverages (juice, etc.)	Ice Cream Novelties	HB 133, pg. 41, 3.12
	Depth Gauge (Titled "Other")	HB 133, pg. 28, 3.4
	Headspace (Titled "Mayonnaise")	HB 133, pg. 29, 3.5
Gift Wrapping	Bidimensional, Flat, Roll	QC Manual, 16-15
Ice Cream, Factory Packed	Displacement (Solids or Semisolid)	HB 133, pg. 42. 3.12
Ice Cream, Pelletized	Net Weight	HB 133, pg. 14
Ice Cream, Hand Pack	Net Weight	HB 133, pg. 14
	Ice Cream Novelties	HB 133, pg. 41, 3.12
Ice Cream Bars, Sandwiches	Ice Cream Novelties	HB 133, pg. 41, 3.12
Landscape Materials Bark, Mulch, Gravel, Rock, Etc.	Mulch and Soil	HB 133, pg. 40, 3.11
Lotions, Liquid	Depth Gauge (Titled "Other")	HB 133, pg. 28, 3.4
	Headspace (Titled "Mayonnaise")	HB 133, pg. 29, 3.5
	Gravimetric	HB 133, pg. 25
Liquids, Thick	Depth Gauge (Titled "Other")	HB 133, pg. 28, 3.4
	Headspace (Titled "Mayonnaise")	HB 133, pg. 29, 3.5
	Gravimetric	HB 133, pg. 25

Product	Procedure(s)	Page and/or Section Number
Liquor, Hard	Liquor	QC Manual, 16-28
Lumber, Board Foot	Lumber, Hardwood	QC Manual, 16-34
Lumber, Dimensional	Lumber, Softwood	QC Manual, 16-35
Margarine	Net Weight	HB 133, pg. 14
Mayonnaise	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
Milk	Gravimetric	HB 133, pg. 25, 3.2
Mulch	Mulch and Soil	HB 133, pg. 40, 3.11
Multi-Unit Packages	Multi-Unit	QC Manual, 16-36
Oil, Edible or Lubricating	Depth Gauge (Titled “Other”) Headspace (Titled “Mayonnaise”) Gravimetric	HB 133, pg. 28, 3.4 HB 133, pg. 29, 3.5 HB 133, pg. 25, 3.2
Olives, Black or Cooked	Drained Weight	HB 133, pg. 20, 2.5
Oysters, Fresh	Fresh Oysters, Volume	HB 133, pg. 45, 3.13
Paint	Depth Gauge (Titled “Other”) In Plant Audit Procedure Possible Violation Procedure Headspace (Titled “Mayonnaise”) Gravimetric	HB 133, pg. 28. 3.4 HB 133, pg. 35 HB 133, pg. 35 HB 133, pg. 29, 3.5 HB 133, pg. 25
Paper Plates	Paper Plates	HB 133, pg. 57, 4.5
Paper, Sanitary Products	Sanitary Paper Products	HB 133, pg. 57, 4.5
Paste	Volume, Very Viscous Materials	HB 133, pg. 37, 3.9
Patching Compounds	Volume, Very Viscous Materials	HB 133, pg. 37, 3.9
Peat Moss	Dry Measure, Peat Moss	HB 133, pg. 38, 3.10
Pet Foods, Dry	Flour & Dry Pet Foods	HB 133, pg. 14

Product	Procedure(s)	Page and/or Section Number
Petroleum Products	Depth Gauge (Titled “Other”)	HB 133, pg. 28, 3.4
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
	Gravimetric	HB 133, pg. 25
Plastic, other than polyethylene	Bidimensional Commodities Flat or Roll	QC Manual, 16-15
	Gravimetric	HB 133, pg. 62, 4.8
Plywood, Particle Board	Plywood	QC Manual, 16-37
Polyethylene		
Sheeting	Polyethylene	HB 133, pg. 59, 4.7
Bags, Tubing, etc.	Polyethylene	QC Manual, 16-38
Popsicles	Ice Cream Novelties	HB 133, pg. 41, 3.12
Pots, Cooking	Goods Labeled by Capacity	HB 133, pg. 30, 3.6
Potting Soil	Dry Measure, Peat Moss	HB 133, pg. 40. 3.11
	Animal Bedding, etc.	QC Manual, 16-9
Roof Patch, Cement	Depth Gauge (Titled “Other”)	HB 133, pg. 28, 3.4
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
Salad Dressing	Depth Gauge (Titled “Other”)	HB 133, pg. 28, 3.4
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
Shavings	Animal Bedding, etc.	QC Manual, 16-9
Shampoo, Conditioners	Depth Gauge (Titled “Other”)	HB 133, pg. 28, 3.4
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
	Gravimetric	HB 133, pg. 25
Shoelaces	Shoelaces	QC Manual, 16-40
Shrimp, IQF, (Individually Quick Frozen)	Glazed Raw Seafood & Fish	HB 133, pg. 22
Shrimp, Frozen Block	Drained Weight, Frozen Food	HB 133, pg. 21, 2.6

Product	Procedure(s)	Page and/or Section Number
Sleeping Bags	Textiles	QC Manual, 16-41
Soup	Net Weight	HB 133, pg. 14
	Gravimetric	HB 133, pg. 25
	Depth Gauge (Titled “Other”)	HB 133, pg. 28, 3.4
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
Syrup	Depth Gauge (Title “Other”)	HB 133, pg. 28, 3.4
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
	Gravimetric	HB 133, pg. 25
Textiles	Textiles	QC Manual, 16-41
Tile, Ceramic	Direct Measure	QC Manual, 15-23
Tubing, Flexible	Tubing	QC Manual, 16-43
Turkey, Whole Frozen	Turkey	QC Manual, 16-45
Tofu	Drained Weight	HB 133, pg. 20, 2.5
Toothpaste	Net Weight	HB 133, pg. 14
Yogurt	Net Weight	HB 133, pg. 14
	Headspace (Titled “Mayonnaise”)	HB 133, pg. 29, 3.5
Wine	Wine	QC Manual, 16-46

ANIMAL BEDDING, SHAVINGS,

AND GARDEN AMENDMENTS

Do **not** use this procedure when testing **Peat Moss, Soil** or **Mulch** (including all above ground dressings for decoration or moisture, weed, erosion, and temperature control).

Instead, use: Peat Moss, Method of Test, Handbook 133, page 38, Section 3.10, or
Mulch or Soil, Method of Test, Handbook 133, page 40, Section 3.11.

NOTE: Peat Moss procedure, Handbook 133, may also be used for testing potting soil and garden amendments.

A. Equipment

1. Calibrated dry measure, or combination of measures, equal to the labeled contents. If possible, use no more than two measures to equal the labeled contents.

   NOTE: The same measure may be used more than once.

2. Calibrated linear measure.

3. Straight edge(s).

4. Tarp or plastic sheet.

5. Bubble level.

6. Calculator (optional).

B. Procedure

1. Select sample packages. Each sample package must be opened and measured. There is no tare sample.

2. Cover a level area with the tarp and set up measure(s).

3. Open each sample package in turn and gently pour the contents into the measure. If the material is compacted or clumped, separate or sift it by hand as it is poured.

4. If the material overfills the measure(s), use a straight edge with a zigzag motion to level the top surface even with the top edge of the measure, allowing the overage to spill onto the tarp. Place the material from the tarp into a calibrated smaller measure and determine the value of the overage (i.e., plus error).

5. If the material from the package does not completely fill the measure (or the last measure, if more than one is being used), either one of two methods may be used to determine the shortage.

   a. Using a straight edge, level the material in the measure taking care not to compact it. Measure from the top edge of the measure down to the level of the material in at least three different locations. Use the average of these three measurements to calculate the volume of the shortage.

   b. If the material is uniform from package to package, use a small calibrated measure equal in volume to the unit of measure. Fill the small measure with previously measured material or material from another package from the lot. Add this to the measure holding the test material. Repeat until the measure containing the test material is completely full, keeping count of the number of small measures added. This number is the value of the shortage in units of measure.

Dry Measure Equivalents

1 dry pint	=	1/2 dry quart / 33.6 cubic inches
1 dry quart	=	2 dry pints / 67.2006 cubic inches
1 peck (pk.)	=	8 dry quarts / 16 dry pints / 537.605 cubic inches
1 bushel (bu.)	=	4 pecks / 32 dry quarts / 2,150.42 cubic inches / 1.2445 cubic ft.
1 cubic foot	=	1728 cubic inches

BEER

VOLUMETRIC TEST PROCEDURE

A. Equipment

1. Calibrated glass graduates “To Contain” (See Special Note 2).
2. Thermometer -20°F to 120°F.
3. Defoaming agent; Hexanol, Octanol (Capryl Alcohol), or commercial anti-foam product.
4. Calculator (optional).

B. Special Notes

1. Beer has a reference temperature of 39.1°F.
2. “To Deliver” graduates may be used if a correction factor is known for the difference between “To Deliver” and “To Contain” graduates.
3. Add defoaming agent to can or bottle as the need arises.
4. Gravimetric testing of beer may be performed by using the procedure for establishing a weight per liquid volume.

C. Procedure

1. Select “To Contain” graduate for the volume of beer under test.
2. Wet graduate with beer and give a 10-second drain. This compensates for the retention in the bottle or can.
3. Pour a sample into wetted graduate giving the sample a 1 minute drain, record volume to be corrected (V_o). When testing cans, a hole should be made to allow for complete drainage.
4. Insert the thermometer in graduate until reading stabilizes, then read temperature.
5. Temperature correction factors for malt beverages can normally be disregarded if testing is performed between 35°F and 45°F.

6. Formula:

Error = V_o [0.0000625 (39.1 - T_o) + 1] - V_L

V_o = Observed volume

T_o = Actual temperature of beer in degrees Fahrenheit

V_L = Labeled volume

0.0000625 = Coefficient of expansion per degree Fahrenheit

D. Examples

1. Example 1:

(a) Observed volume is 11.75 fl oz

(b) Observed temperature is 76°F

(c) Labeled volume is 12 fl oz

(d) Utilizing the formula:

V_o = 11.75 fl oz

T_o = 76°F

V_L = 12 fl oz

Error = 11.75 fl oz [0.0000625 (39.1 - 76) + 1] - 12 fl oz = -0.27 fl oz

2. Example 2:

(a) Observed volume is 12.25 fl oz

(b) Observed temperature is 60°F

(c) Labeled volume is 12 fl oz

(d) Utilizing the formula:

V_o = 12.25 fl oz

T_o = 60°F

V_L = 12 fl oz

Error = 12.25 fl oz [0.0000625 (39.1 - 60) + 1] - 12 fl oz = +0.23 fl oz

BIDIMENSIONAL IRREGULAR COMMODITIES

WEIGHT METHOD

A. Equipment

1. Paper of uniform thickness at least as large in area as the specimen to be measured.

2. An instrument for cutting the paper.

3. Balance accurate to 0.01 gram and weights when required.

4. Rule or tape graduated in millimeters.

B. Procedure

1. The piece of paper shall be placed flat on a smooth surface. The specimen shall be placed flat on the paper and the area of the specimen traced on the paper. The paper shall be cut to the shape of the specimen, weighed, and the weight recorded to the nearest 0.1 gram as W_1. A rectangle consisting of more than half of the total area of the weighed paper shall be cut from the weighed paper. The paper rectangle shall be weighed and the weight recorded as W_2. The dimensions of the paper rectangle shall be measured to the nearest millimeter by means of the graduated rule or tape, the area calculated by multiplying the width by the length and the value recorded to the nearest square centimeter as A.

2. Calculation. The area of the specimen shall be calculated as follows:

$$\text{Area, Square Centimeters} = \frac{W_1 \times A}{W_2}$$

W_1 = Weight of the specimen-shaped paper, grams

W_2 = Weight of the paper rectangle, grams

A = Area of the paper rectangle, square centimeters

3. The area of the rectangle should be recorded to the nearest square centimeter.

C. Reference: Federal Test Method Standard Number 311.

BIDIMENSIONAL IRREGULAR COMMODITIES

TEMPLATE METHOD

A. Equipment

A transparent, flexible template graduated in square centimeters. The template shall be large enough to cover the specimen completely.

B. Procedure

The specimen shall be placed on a smooth surface. The template shall be placed smoothly over the specimen. The area shall be determined by counting the number of square centimeters covering the surface of the specimen. Parts of the squares of the template not completely covered by the specimen shall be estimated and the value recorded to the nearest 0.5 square centimeters.

C. Reference: Federal Test Method Standard Number 311.

BIDIMENSIONAL FLAT OR ROLL COMMODITIES

A. Equipment

1. Calibrated linear measure.

2. Calculator (optional).

B. This procedure may be used to verify the width and length of most regularly shaped flat or roll type bidimensional commodities, e.g., tarps, tape, ribbon, bandages, food wrap, gift wrap, etc.

NOTE: There are specific test procedures for the following commodities: **Hardwood Lumber-Board foot**, page 16-34; **Lumber- Dimensional**, page 16-35 Paper **Towels, Tissue, Napkins, etc.** Handbook 133, page 57, 4.5; **Paper Plates**, Handbook 133, page, 57, 4.5; **Polyethylene Sheeting**, Handbook 133, page 59, 4.7; **Polyethylene Bags, Tubing, Other Plastics**, page 16-38; **Plywood**, page 16-37; and **Textiles**, page 16-42.

C. Procedure

1. Remove commodity from package, place on smooth surface.

2. Smooth out creases or wrinkles and secure in place. If necessary apply sufficient tension to woven, un-stretchable, tarps or fabrics to remove wrinkles or creases in the fabric that would adversely affect measurement. This can be done at the time of, and at the point of each measurement. However do not risk damage or measurement errors when measuring products that easily stretch or tear under application of tension.

3. To determine the width:

   a. For commodities labeled 10 feet or less in length, take three measurements across the width at locations approximately 1/4, 1/2, and 3/4 along the length of the commodity and compute the average width.

   b. For commodities labeled greater than 10 feet in length, take one additional width measurement, up to a maximum of 10 measurements, per every additional 10 feet, or portion thereof. The measurements should be evenly spaced at approximately equal intervals along the length. Width measurements should not be made across the ends of the commodity.

4. To determine the length:

   a. For commodities labeled 2 inches or less in width, take one measurement along the length. The measurement should not be made along the edges. (If desired, more measurements may be taken and an average length calculated.)

b. For commodities labeled from 2 inches up to and including 2 feet in width, take at least 2 measurements and compute the average length. The measurements should be spaced at approximately equal intervals and not be made along the edges.

c. For commodities labeled from 2 feet up to and including 10 feet, take at least 3 measurements spaced at approximately equal intervals across the width, and compute the average width. Measurements should not be made along the edges.

d. For commodities labeled 10 feet or wider, take 3 measurements plus one additional length measurement, up to a maximum of 10 measurements, per every additional 10 feet, or portion thereof, in labeled width.

5. To be in compliance, the width or average width must meet the stated width, **and** the length or average length must meet the stated length. Both must be correct independently of the other. A separate Package Inspection Report must be completed for each dimension tested.

CARBONATED BEVERAGES

(NONALCOHOLIC)

A. Equipment

Appropriate size test measure calibrated “To Deliver.”

B. Procedure

1. Rinse test measure with water. Drain for 10 seconds after water comes to the drip stage.

2. Open each sample container immediately prior to pouring. Pour product into test measure. Give the container a 1 minute drain after the product comes to the drip stage.

3. Observe the quantity of the product immediately after the excess foam has died down. It is not necessary to use a defoaming agent if this occurs within approximately 30 seconds after pouring.

4. Record errors on the appropriate form.

5. Rinse the test measure with water and give a 10-second drain between measurements of sample containers.

C. General Information

Commodities requiring refrigeration to maintain freshness or retard spoilage are tested at 40°F; others at 68°F.

In order to completely drain the can, punch a hole in the can just below the top rim. Punch from the inside to the outside so that any remaining liquids will flow out of the can. This should be done before the container has been completely emptied (approximately 1/2 full).

NOTE: Carbonated beverages may also be tested gravimetrically, see procedure “Gravimetric,” Handbook 133, page 25.

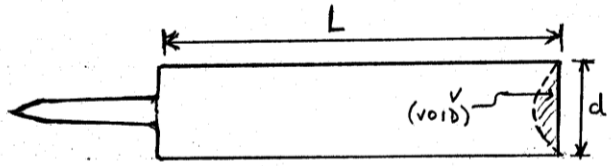
CAULKING AND SEALANTS IN TUBES (VOLUME)

A. Equipment

1. Calibrated measure (linear or caliper).
2. Calibrated graduate “To Deliver”, density cup or pycnometer.
3. Slicker plate.
4. Calculator (optional).
5. Caulking gun (optional).

B. Special Note

Gravimetric testing of caulking and sealants may be performed by using the procedure for density cup or pycnometer, Handbook 133, page 37, 3-9.



C. Procedure

1. All tubes in the sample must be measured.
2. Carefully push the inner cap into the tube until it is in contact with the caulking material; this can be accomplished by using a caulking gun.
3. Determine the average length (*L*), and average diameter (*d)*. A minimum of three measurements should be taken for each. Round each measurement up to the nearest 1/32 inch or 0.02 inch. Convert any fraction to a decimal.
4. Determine volume of the void (*v*). Using slicker plate and graduate, fill void with measured amount of water.
5. Calculate volume of tube contents (V) in cubic inches using*:*

$$V = [\,\pi\,(d^2 \div 4)\,L\,] - v$$

where $\pi = 3.1416$, d = average internal diameter of tube
L = average length of tube v = volume of void

Multiply result by 0.554 112 6 for fluid ounces, or by 16.387 06 for milliliters.

FIREWOOD - BULK

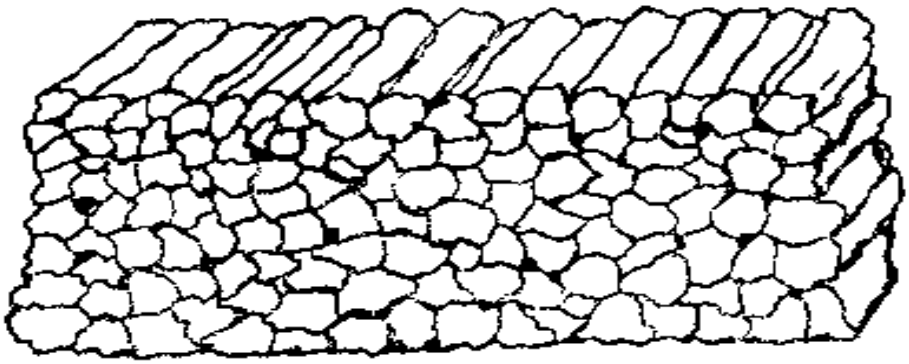
UNPACKAGED OR PACKAGES LABELED 4 CUBIC FEET OR MORE

A. Equipment

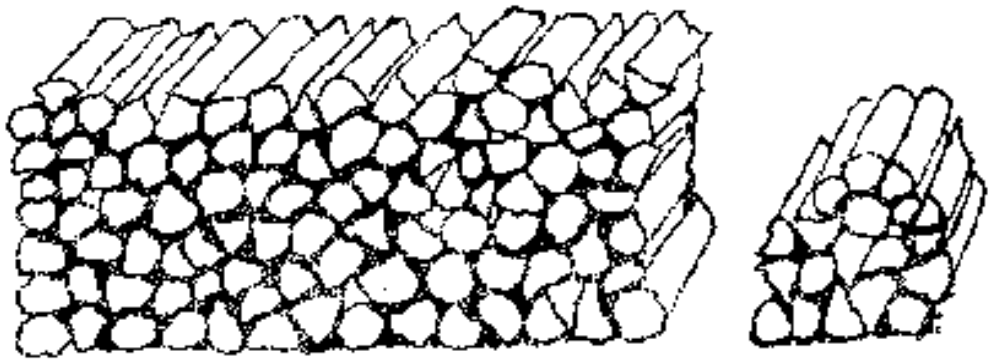
1. Calibrated linear measure.
2. Calculator.
3. Gloves (optional).

B. Special Notes

1. Testing firewood is more easily performed by two people.
2. Measurements are made in increments no greater than 1/8 inch. A measurement falling between increments is rounded up to the next higher increment.
3. Inspection is made after the firewood has been delivered and stacked in a geometrical shape that will simplify calculations (i.e., rectangular, triangular or a combination). The stack may need adjustment before measuring. Width measurements may be made during the stacking process.
4. Ranked and well-stowed means the pieces of wood are placed parallel to each other and touching so that air spaces are kept to a minimum.



Cord of 128 cubic feet ranked and well-stowed.

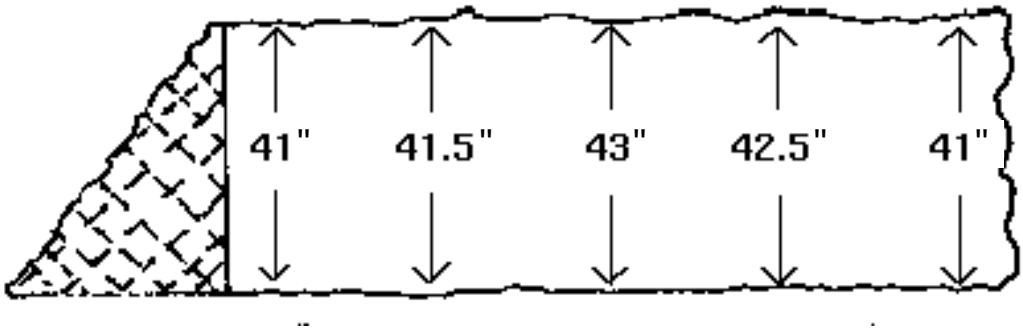


Same cord of 128 cubic feet, not ranked and well-stowed. Shows overage!

C. Procedure

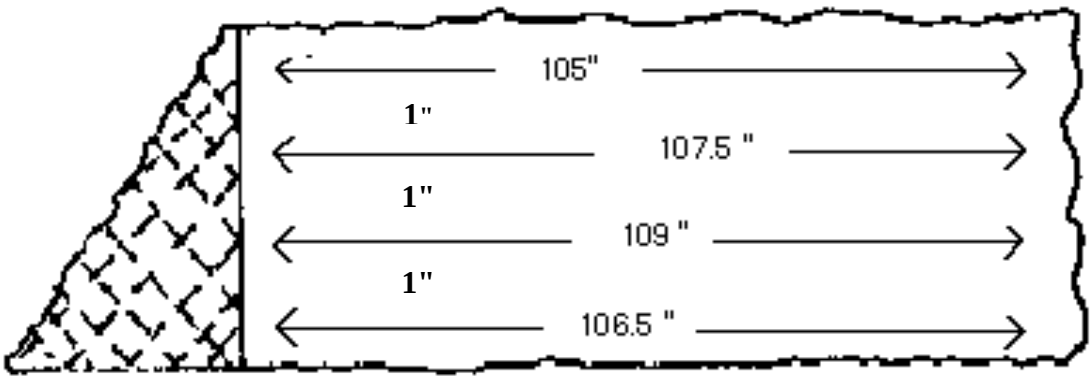
1. Measurement of a rectangular stack or rectangular portion of a stack.

   a. Average Height: Starting at one end of the stack, measure the height of the stack, on both sides, at approximately 2 foot intervals, along the length of the stack, or at four proportionately equal intervals if the stack is less than 6 feet long. (Minimum of 4 measurements on each side shall be taken.) Calculate the average height.



Average Height = (41" + 41.5" + 43" + 42.5" + 41") ÷ 5 = 41.8"

   b. Average Length: Starting at the base, measure the length of the stack at approximate 1 foot intervals up to the top, or at four proportionately equal intervals if the stack is less than 3 feet high. (Minimum of 4 measurements) Calculate the average length.

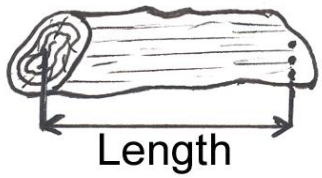


Average Length = (106.5" + 109" + 107.5" + 105") ÷ 4 = 107 inches

c. Average Width: This dimension is calculated by averaging the length of individual pieces of wood. A representative random sample of the individual pieces shall be selected. If a triangular stack is combined with a rectangular stack, the sample shall be selected randomly from the entire stack. The minimum sample size is in the following table.

Amount Represented	Number of Pieces
1/2 cord and less	12
More than 1/2 cord to 1 cord	24
Over 1 cord to 1-1/2 cords	36
Over 1-1/2 cords to 2 cords	48
Over 2 cords	48 plus 12 for each 1/2 cord or fraction thereof

Measure the length of the pieces, measuring from center-to-center, as shown. Calculate the average length.

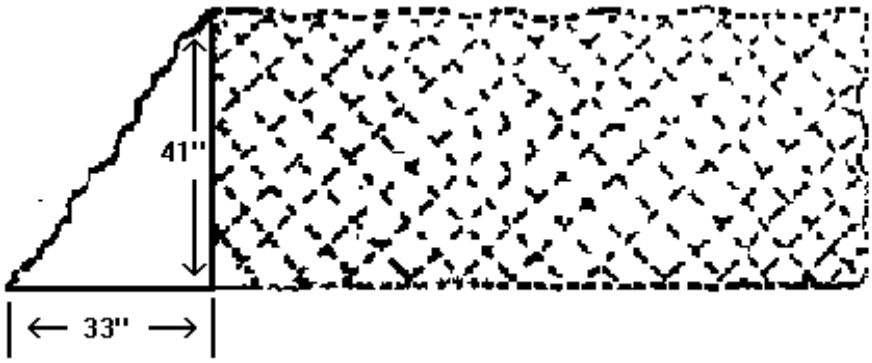


Length of Angle-Cut Log

Average Length = (18" + 18.25" + 19" + 17.75" + 18.5" + 18") ÷ 6 = 18.25 in

2. Measurement of a triangular portion of a stack:

a. Measure the height and the base of the triangular portion.



Triangular Measurements: Height = 41"; Length = 33"

b. Average width of the stack is the same as previously calculated.

3. Calculate the volume:

a. Volume of the rectangular portion = average height of the stack x average length of the stack x average width of the stack. (Example: 41.8" x 107" x 18.25" = 81,624.95 cu in)

b. Volume of the triangular portion = height x base length x average width of the stack divided by 2. (Example: 41" x 33" x 18.25" ÷ 2 = 12,346.125 cu in)

c. Volume of the combined portions = volume of the rectangular portion + volume of triangular portion. (Example: 81,624.95 cu in + 12,346.125 cu in = 93,971.075 cu in)

NOTE: For stacks with multiple rows, the volume of the total stack is the sum of the volumes of the individual rows.

d. Volume of stack in cords = volume of stack in cubic inches divided by 221,184 cubic inches per cord. (Example: 93,971.075 cu in ÷ 221,184 cu in per cord = 0.42 cords)

e. Percentage of the cord = decimal fraction of the cord times 100.
(Example: 0.42 cords x 100 = 42% [Percent].)

TABLE OF EQUIVALENTS

1 cubic foot = 1,728 cubic inches
1 cord = 128 cubic feet = 221,184 cubic inches

Common Fractions		Decimal Fractions		Percentages
1/8	=	.125	=	12.5%
1/4	=	.25	=	25%
3/8	=	.375	=	37.5%
1/2	=	.5	=	50%
5/8	=	.625	=	62.5%
3/4	=	.75	=	75%
7/8	=	.875	=	87.5%

CONVERSIONS AND EQUIVALENTS FOR FIREWOOD INSPECTIONS

CUBIC INCH EQUIVALENTS FOR COMMONLY USED CUBIC FOOT LABELS

CUBIC FOOT	CUBIC INCH
2 1/4 (2.25)	3,888
2.2	3,801.6
2	3,456
1.9	3,283.2
1.75	3,024
1.7	2,937.6
1-1/2	2,592
1.4	2,419.2
1	1,728
0.9	1,555.2
7/8	1,512
0.8	1,382.4
3/4 (0.75)	1,296
0.7	1,209.6
0.65	1,123.2
5/8	1,080
0.6	1,036.8
1/2 (0.5)	864
3/8	648
1/4 (0.25)	432
1/8	216

DECIMAL EQUIVALENTS FOR COMMONLY USED FRACTIONS

FRACTION	DECIMAL
7/8	0.875
3/4	0.750
5/8	0.625
1/2	0.500
3/8	0.375
1/4	0.250
1/8	0.125

SI (METRIC) - INCH - POUND CONVERSION FACTORS

SI (METRIC)	INCH - POUND
1 cm^3 (cubic centimeter)	0.06102374 in^3 (cubic inch)
1 dm^3 (cubic decimeter)	0.0353147 ft^3 (cubic foot)
1 m^3 (cubic meter)	35.3147 ft^3

INCH - POUND	SI (METRIC)
1 in^3 (cubic inch)	16.3871 cm^3 (cubic centimeter)
1 ft^3 (cubic foot)	28.3168 dm^3 (cubic decimeters) 0.0283168 m^3 (cubic meter)

FIREWOOD IN CONTAINERS

LABELED CONTENTS OF 4 CUBIC FEET OR LESS

A. Equipment

1. Calibrated linear measure.
2. Calculator (optional).
3. Gloves (optional).

Additionally for Bundles

1. Tracing Paper.
2. Template marked in square inches.
3. Strap(s) for securing bundle.

B. Special Notes

1. Measurements are made in increments no greater than 1/8 inch. Except when measuring the height of boxed wood, a measurement falling between increments is rounded up to the next higher increment.

2. Unless otherwise indicated, all measurements are to be taken without rearranging the wood or removing it from the package.

3. Ranked and well-stowed means the pieces of wood are stacked so that the individual pieces are touching and parallel, and in a compact manner minimizing spaces between pieces.

4. If the layers of wood are cross-hatched or not ranked in distinct sections in the package, the wood shall be removed from the package and measured according to the procedures for bulk firewood, Handbook 133, 4th Edition Checking the Net Contents of Packaged Goods (HB 133), Section 3.15 Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L (4 Ft^3) or Less, Section 3.16 (Boxed Firewood) and 3.17 (Crosshatched Firewood), and page 16-19. **Note: While the procedures provided on the following pages are similar, they are not exact word for word of what is in HB 133). Use the information on these pages for reference only as the diagrams provided on pages 16-25 and 16-26 were removed from HB 133 when it was edited in 2003.**

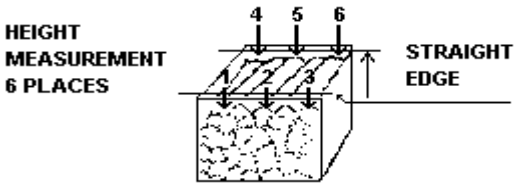
C. Procedure

1. Boxed wood.

   a. Average height determination of wood within the box:

      Open the box and measure the internal height of the box (h).

      Take three measurements (d) along each end of the stack by measuring from the bottom of a straight edge placed across the top of the box to the highest point on the two outer-most top pieces of wood and the center-most top piece of wood rounding measurements down to the nearest 1/8 inch.

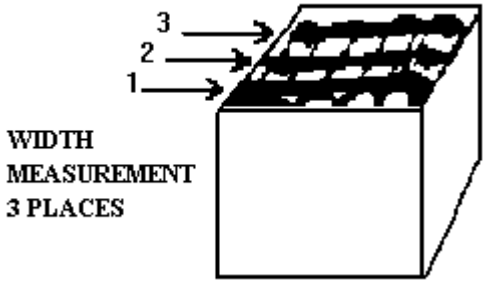


Calculate the average width

Average Height of Stack = $h - [(d^1 + d^2 + d^3 + d^4 + d^5 + d^6) \div 6]$

b. Average width of the wood within the box:

To determine the width, take three measurements. These measurements shall be taken on both ends and in the middle of the box, measuring the inside distance from

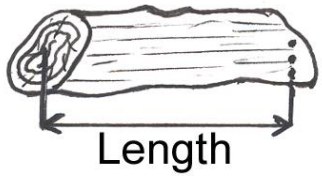


one side of the box to the other, perpendicular to the long axis of the wood.

Calculate the average width

Average Width = $(W^1 + W^2 + W^3) \div 3$

c. Average length of the pieces of wood: Remove the wood from the box and select the five pieces with the greatest girth. Measure the length of the five pieces, measuring from center-to-center.



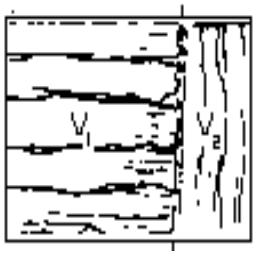
Calculate the average length of the five pieces

Average Length = $(L^1 + L^2 + L^3 + L^4 + L^5) \div 5$

d. Calculate the volume of the wood within the box.

$$\text{Volume of Wood (in cu ft)} = \text{Average Height (in inches)} \times \text{Average Width (in inches)} \times \text{Average Length (in inches)} \div 1728\ \text{in}^3/\text{ft}^3$$

e. For boxes of wood packed with the pieces in two distinct sections (at right angles to each other), calculate the volume of wood in the box by determining the average height, width, and length as in 1a, 1b, and 1c for each section, then totaling the calculated volumes of the two sections. Except that the width measurement for V_2 shall be taken from the inside edge of the box adjacent to V_2 to the plane separating V_1 and V_2.



Total Volume = $V_1 + V_2$

2. Bundles and Bags of Firewood.

a. Average area of ends:

Secure a strap around each end of the bundle or bag of wood to prevent movement during testing and to provide a definite perimeter. Set one end of the bundle or bag on tracing paper large enough to cover the end completely. Draw a line around the perimeter of the bundle or bag on the tracing paper. Transfer the tracing paper to a template graduated in square inches. Count the number of square inches enclosed within the perimeter line (portions of square inches not completely within the perimeter line shall be estimated to the nearest one quarter square inch). Repeat this process on the opposite end of the bundle or bag. Calculate the average area.

$$\text{Average Area} = (\text{Area \#1} + \text{Area \#2}) \div 2$$

NOTE: Two thin straps, one inch to two inches wide, with connecting buckles, and long enough to easily encircle the bundle or bag, should be used to secure the wood.

b. Average length of the pieces of wood:

Select the five pieces with the greatest girth. Measure the length of the pieces as shown in Step 1c. for boxed wood.

Calculate the average length of the pieces of wood.

Average Length = $(L^1 + L^2 + L^3 + L^4 + L^5) \div 5$

c Calculate the volume of the wood.

$$\underset{(\text{in cu ft})}{\text{Volume of Wood}} = \underset{(\text{in inches}^2)}{\text{Average Area}} \times \underset{(\text{in inches})}{\text{Average Length}} \div 1728\,\text{in}^3$$

LIQUOR

VOLUMETRIC TEST PROCEDURE

A. Equipment

1. Calibrated glass graduates “To Contain” (see Special Note 1).

2. Thermometer -20°F to 120°F.

3. Calculator (optional).

B. Special Notes

1. “To Deliver” graduates may be used if a correction factor is known for the difference between “To Deliver” and “To Contain” graduates which must be added to the observed volume before calculations.

2. Gravimetric testing of liquor may be performed by using the procedure for establishing a weight per liquid volume.

C. Procedure

1. Select “To Contain” graduate for the volume of liquor that you wish to test.

2. Wet graduate with liquor and give a 10-second drain. This compensates for the retention in the liquor bottle.

3. Pour a sample bottle into wetted graduate. After giving the sample a 1 minute drain, record the volume to be corrected (V_O).

4. Insert the thermometer in graduate until reading stabilizes, then read temperature.

5. Liquor is corrected to 60°F by using the values from Table 7, beginning on page 257.

6. Formula: Error = $[V_O \times (CF_{ot})] - V_L$ V_O = Observed Volume

CF_{ot} = Correction Factor for the observed liquor temperature in degrees Fahrenheit from Table 7

V_L = Labeled Volume

D. Examples

1. Liquor temperature is 84°F.

   Proof is 80.6 (use table value for 80 proof).

   CF_{ot} = 0.991

   Labeled Volume is 750 ml V_L = 750 ml

   Observed Volume is 746 ml V_O = 746 ml

   Error = $[V_O \times (CF_{ot})] - V_L$

   Error = [746 ml x (0.991)] - 750 ml = -10.71 ml

2. Liquor temperature is 64°F.

   Proof is 70.

   CF_{ot} = 0.999

   Labeled Volume is 1.75 L (1750 ml) V_L = 1750 ml

   Observed Volume is 1746 ml V_O = 1746 ml

   Error = $[V_O \times (CF_{ot})] - V_L$

   Error = [1746 ml x (0.999)] - 1750 ml = -5.75 ml

E. Reference

Bureau of Alcohol, Tobacco and Firearms.

TABLE NUMBER 7, TABLE FOR CORRECTION OF VOLUME TO 60°F

Proof	Temperature °F										
	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°
5											1.001
10											1.001
15											1.001
20								1.002	1.002	1.002	1.002
25								1.002	1.002	1.002	1.002
30			1.003	1.003	1.003	1.002	1.002	1.002	1.002	1.002	1.002
35			1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003
40	1.006	1.004	1.004	1.004	1.004	1.004	1.004	1.004	1.004	1.003	1.003
45	1.007	1.006	1.006	1.005	1.005	1.005	1.005	1.005	1.004	1.004	1.004
50	1.008	1.007	1.007	1.006	1.006	1.006	1.006	1.005	1.005	1.005	1.004
55	1.009	1.008	1.008	1.008	1.007	1.007	1.007	1.006	1.006	1.006	1.005
60	1.010	1.010	1.009	1.009	1.008	1.008	1.008	1.007	1.007	1.006	1.006
65	1.011	1.011	1.010	1.010	1.009	1.009	1.008	1.008	1.007	1.007	1.006
70	1.013	1.012	1.012	1.011	1.010	1.010	1.009	1.009	1.008	1.008	1.007
75	1.014	1.013	1.013	1.012	1.011	1.011	1.010	1.010	1.009	1.008	1.008
80	1.015	1.014	1.013	1.013	1.012	1.011	1.011	1.010	1.009	1.009	1.008
85	1.016	1.015	1.014	1.014	1.013	1.012	1.011	1.011	1.010	1.009	1.008
90	1.016	1.016	1.015	1.014	1.013	1.013	1.012	1.011	1.010	1.010	1.009
95	1.017	1.016	1.016	1.015	1.014	1.013	1.012	1.012	1.011	1.010	1.009
100	1.018	1.017	1.016	1.015	1.014	1.014	1.013	1.012	1.011	1.010	1.009
105	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.012	1.011	1.011	1.010
110	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.013	1.012	1.011	1.010
115	1.019	1.018	1.017	1.016	1.016	1.015	1.014	1.013	1.012	1.011	1.010
120	1.019	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.011	1.010
125	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.012	1.011
130	1.020	1.019	1.018	1.017	1.016	1.016	1.015	1.014	1.013	1.012	1.011
135	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.011
140	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.011
145	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.011
150	1.022	1.021	1.020	1.019	1.018	1.017	1.015	1.014	1.013	1.012	1.011
155	1.022	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012
160	1.022	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012
165	1.023	1.022	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012
170	1.023	1.022	1.021	1.020	1.019	1.018	1.016	1.015	1.014	1.013	1.012
175	1.023	1.022	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.013	1.012
180	1.024	1.022	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.012
185	1.024	1.023	1.022	1.021	1.019	1.018	1.017	1.016	1.015	1.014	1.013
190	1.024	1.023	1.022	1.021	1.020	1.019	1.017	1.016	1.015	1.014	1.013
195	1.024	1.023	1.022	1.021	1.020	1.019	1.018	1.016	1.015	1.014	1.013
200	1.025	1.024	1.022	1.021	1.020	1.019	1.018	1.017	1.015	1.014	1.013

TABLE NUMBER 7, TABLE FOR CORRECTION OF VOLUME TO 60°F

Proof	40°	42°	44°	46°	48°	50°	52°	54°	56°	58°
0	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000	.1000	1.000
5	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
10	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
15	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
20	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
25	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
30	1.002	1.002	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.000
35	1.003	1.002	1.002	1.002	1.002	1.001	1.001	1.001	1.001	1.000
40	1.003	1.003	1.002	1.002	1.002	1.002	1.001	1.001	1.001	1.000
45	1.004	1.003	1.003	1.003	1.002	1.002	1.002	1.001	1.001	1.000
50	1.004	1.004	1.003	1.003	1.003	1.002	1.002	1.001	1.001	1.000
55	1.005	1.004	1.004	1.003	1.003	1.002	1.002	1.002	1.001	1.000
60	1.005	1.005	1.004	1.004	1.003	1.003	1.002	1.002	1.001	1.001
65	1.006	1.005	1.005	1.004	1.004	1.003	1.002	1.002	1.001	1.001
70	1.006	1.006	1.005	1.005	1.004	1.003	1.003	1.002	1.001	1.001
75	1.007	1.006	1.006	1.005	1.004	1.003	1.003	1.002	1.001	1.001
80	1.007	1.007	1.006	1.005	1.004	1.004	1.003	1.002	1.001	1.001
85	1.008	1.007	1.006	1.005	1.005	1.004	1.003	1.002	1.002	1.001
90	1.008	1.007	1.006	1.006	1.005	1.004	1.003	1.002	1.002	1.001
95	1.008	1.008	1.007	1.006	1.005	1.004	1.003	1.003	1.002	1.001
100	1.009	1.008	1.007	1.006	1.005	1.004	1.004	1.003	1.002	1.001
105	1.009	1.008	1.007	1.006	1.005	1.004	1.004	1.003	1.002	1.001
110	1.009	1.008	1.007	1.006	1.005	1.005	1.004	1.003	1.002	1.001
115	1.009	1.008	1.007	1.007	1.006	1.005	1.004	1.003	1.002	1.001
120	1.009	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
125	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
130	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
135	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
140	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
145	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
150	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
155	1.011	1.010	1.009	1.007	1.006	1.005	1.004	1.003	1.002	1.001
160	1.011	1.010	1.009	1.008	1.006	1.005	1.004	1.003	1.002	1.001
165	1.011	1.010	1.009	1.008	1.007	1.005	1.004	1.003	1.002	1.001
170	1.011	1.010	1.009	1.008	1.007	1.006	1.004	1.003	1.002	1.001
175	1.011	1.010	1.009	1.008	1.007	1.006	1.004	1.003	1.002	1.001
180	1.011	1.010	1.009	1.008	1.007	1.006	1.005	1.003	1.002	1.001
185	1.011	1.010	1.009	1.008	1.007	1.006	1.005	1.003	1.002	1.001
190	1.012	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.002	1.001
195	1.012	1.011	1.009	1.008	1.007	1.006	1.005	1.004	1.002	1.001
200	1.012	1.011	1.010	1.008	1.007	1.006	1.005	1.004	1.002	1.001

TABLE NUMBER 7, TABLE FOR CORRECTION OF VOLUME TO 60°F

Proof	60°	62°	64°	66°	68°	70°	72°	74°	76°	78°
0	1.000	1.000	1.000	.999	.999	.999	.999	.998	.998	.998
5	1.000	1.000	1.000	.999	.999	.999	.999	.998	.998	.998
10	1.000	1.000	1.000	.999	.999	.999	.999	.998	.998	.998
15	1.000	1.000	1.000	.999	.999	.999	.999	.998	.998	.998
20	1.000	1.000	1.000	.999	.999	.999	.998	.998	.998	.997
25	1.000	1.000	1.000	.999	.999	.999	.998	.998	.998	.997
30	1.000	1.000	.999	.999	.999	.998	.998	.998	.997	.997
35	1.000	1.000	.999	.999	.999	.998	.998	.998	.997	.997
40	1.000	1.000	.999	.999	.998	.998	.998	.997	.997	.996
45	1.000	1.000	.999	.999	.998	.998	.997	.997	.996	.996
50	1.000	1.000	.999	.999	.998	.998	.997	.997	.996	.995
55	1.000	.999	.999	.998	.998	.997	.997	.996	.996	.995
60	1.000	.999	.999	.998	.998	.997	.996	.996	.995	.995
65	1.000	.999	.999	.998	.997	.997	.996	.995	.995	.994
70	1.000	.999	.999	.998	.997	.997	.996	.995	.994	.994
75	1.000	.999	.999	.998	.997	.996	.996	.995	.994	.993
80	1.000	.999	.998	.998	.997	.996	.995	.995	.994	.993
85	1.000	.999	.998	.998	.997	.996	.995	.994	.994	.993
90	1.000	.999	.998	.998	.997	.996	.995	.994	.993	.992
95	1.000	.999	.998	.997	.997	.996	.995	.994	.993	.992
100	1.000	.999	.998	.997	.996	.996	.995	.994	.993	.992
105	1.000	.999	.998	.997	.996	.995	.995	.994	.993	.992
110	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.992
115	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.991
120	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.991
125	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.991
130	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.991
135	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.991
140	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.991
145	1.000	.999	.998	.997	.996	.995	.994	.993	.992	.990
150	1.000	.999	.998	.997	.996	.995	.994	.993	.991	.990
155	1.000	.999	.998	.997	.996	.995	.994	.992	.991	.990
160	1.000	.999	.998	.997	.996	.995	.993	.992	.991	.990
165	1.000	.999	.998	.997	.996	.994	.993	.992	.991	.990
170	1.000	.999	.998	.997	.995	.994	.993	.992	.991	.990
175	1.000	.999	.998	.997	.995	.994	.993	.992	.991	.990
180	1.000	.999	.998	.997	.995	.994	.993	.992	.991	.990
185	1.000	.999	.998	.997	.995	.994	.993	.992	.991	.989
190	1.000	.999	.998	.996	.995	.994	.993	.992	.991	.989
195	1.000	.999	.998	.996	.995	.994	.993	.992	.990	.989
200	1.000	.999	.998	.996	.995	.994	.993	.992	.990	.989

TABLE NUMBER 7, TABLE FOR CORRECTION OF VOLUME TO 60°F

Proof	80°	82°	84°	86°	88°	90°	92°	94°	96°	98°	100°
0	.998	.997	.997	.997	.996	.996	.996	.995	.995	.994	.994
5	.998	.997	.997	.997	.996	.996	.996	.995	.995	.994	.994
10	.997	.997	.997	.996	.996	.996	.995	.995	.995	.994	.994
15	.997	.997	.997	.996	.996	.996	.995	.995	.994	.994	.993
20	.997	.997	.996	.996	.996	.995	.995	.994	.994	.994	.993
25	.997	.996	.996	.996	.995	.995	.994	.994	.994	.993	.993
30	.997	.996	.996	.995	.995	.994	.994	.994	.993	.993	.992
35	.996	.996	.995	.995	.994	.994	.993	.993	.992	.992	.991
40	.996	.995	.995	.994	.994	.993	.993	.992	.992	.991	.991
45	.995	.995	.994	.994	.993	.993	.992	.991	.991	.990	.990
50	.995	.994	.994	.993	.993	.992	.991	.991	.990	.990	.989
55	.994	.994	.993	.993	.992	.991	.991	.990	.989	.989	.988
60	.994	.993	.993	.992	.991	.991	.990	.989	.988	.988	.987
65	.993	.993	.992	.991	.991	.990	.989	.988	.988	.987	.986
70	.993	.992	.991	.991	.990	.989	.988	.988	.987	.986	.985
75	.993	.992	.991	.990	.989	.989	.988	.987	.986	.985	.985
80	.992	.991	.991	.990	.989	.988	.987	.986	.986	.985	.984
85	.992	.991	.990	.989	.988	.988	.987	.986	.985	.984	.983
90	.992	.991	.990	.989	.988	.987	.986	.985	.984	.984	.983
95	.991	.990	.989	.989	.988	.987	.986	.985	.984	.983	.982
100	.991	.990	.989	.988	.987	.986	.985	.984	.984	.983	.982
105	.991	.990	.989	.988	.987	.986	.985	.984	.983	.982	.981
110	.991	.990	.989	.988	.987	.986	.985	.984	.983	.982	.981
115	.990	.989	.988	.987	.986	.985	.984	.983	.982	.981	.980
120	.990	.989	.988	.987	.986	.985	.984	.983	.982	.981	.980
125	.990	.989	.988	.987	.986	.985	.984	.983	.982	.981	.980
130	.990	.989	.988	.987	.986	.985	.984	.983	.982	.981	.979
135	.990	.989	.988	.987	.986	.985	.983	.982	.981	.980	.979
140	.990	.989	.987	.986	.985	.984	.983	.982	.981	.980	.979
145	.989	.988	.987	.986	.985	.984	.983	.982	.981	.980	.979
150	.989	.988	.987	.986	.985	.984	.983	.982	.980	.979	.978
155	.989	.988	.987	.986	.985	.984	.982	.981	.980	.979	.978
160	.989	.988	.987	.986	.984	.983	.982	.981	.980	.979	.978
165	.989	.988	.987	.985	.984	.983	.982	.981	.980	.979	.977
170	.989	.988	.986	.985	.984	.983	.982	.981	.979	.978	.977
175	.989	.987	.986	.985	.984	.983	.982	.980	.979	.978	.977
180	.988	.987	.986	.985	.984	.982	.981	.980	.979	.978	.977
185	.988	.987	.986	.985	.984	.982	.981	.980	.979	.977	.976
190	.988	.987	.986	.985	.983	.982	.981	.980	.979	.977	.976
195	.988	.987	.986	.985	.983	.982	.981	.980	.978	.977	.976
200	.988	.987	.986	.984	.983	.982	.981	.980	.978	.977	.976

LUMBER, HARDWOOD

BOARD FOOT CALCULATION

A. Equipment

1. Calibrated linear measure.

2. Calculator (optional).

B. Special Notes

1. This procedure applies to wholesale and nonconsumer sales, and to random width hardwood lumber sold at retail.

2. This procedure is **not** applicable to retail sale of "Surfaced (S4S) Hardwood Lumber Manufactured to Stock Widths." See: Method of Sale - Wood, Hardwood, page 15-27 and NIST HB 130, Sections 2.12, 2.12.3.1, and 2.12.3.2

C. Board Foot

A board foot is one foot long, one foot wide, and one inch thick, or its equivalent.

1. Procedures for calculation of board feet:

a. Physical measurement: Measure the actual width, thickness, and length in inches.

$$\text{Board Feet} = \frac{\text{Width} \times \text{Thickness} \times \text{Length}}{144}$$

b. Industry method:

$$\text{Board Feet} = \frac{\text{Width in Inches} \times \text{Length* in Feet} \times \text{Thickness in Inches}}{12}$$

By convention, fractional board foot units are rounded to the nearest whole number.

c. The board foot measure of 1 inch thick boards is equal to the surface measure, S.M.

$$\text{S.M.} = \frac{\text{Width in Inches} \times \text{Length* in Feet}}{12}$$

By convention, the surface measure is rounded to the nearest whole number.

* Fractional lengths are recorded as the next lower whole foot.

D. Reference: National Hardwood Lumber Association Grading Rules.

LUMBER, SOFTWOOD and LUMBER SUBSTITUTES

A. Equipment

1. Certified linear measure (tape or steel rule)

2. Certified Caliper or micrometer

3. Copy of Voluntary Product Standard 20-05 for Softwood Lumber.

4. Calculator.

B. Notes

This procedure may be used to verify the width, length, and thickness of most regularly shaped dimensional lumber or lumber substitutes. Most Softwood lumber is represented by a nominal dimension, not its actual milled size. Lumber Substitutes must be labeled by actual dimension as they are not covered under the scope of the Voluntary Product Standard for Softwood lumber.

NOTE: There are other specific test procedures for the following commodities: **Hardwood Lumber**, page 16-34 and **Plywood**, page 16-37

C. Procedure

1. Place commodity on a flat surface.

2. To determine the width or thickness:

   a. For commodities labeled 10 feet or less in length, take three measurements across the width/thickness at locations approximately 1/4, 1/2, and 3/4 along the length of the commodity and compute the average width.

   b. For commodities labeled greater than 10 feet in length, take one additional measurement, per every additional 6 feet, or portion thereof. The measurements should be evenly spaced at approximately equal intervals along the length. Measurements should not be made across the ends of the commodity or in areas where lumber has a knot or product has damage that would affect the measurement.

   c. Measurements should be made at various locations and on both sides of the board taking care not to measure closer than 6 inches from the corners.

3. To determine the length:

   a. For commodities labeled 6 inches or less in width, take one measurement along the length. The measurement should not be made along the edges. (If desired, more measurements may be taken and an average length calculated.)

   b. For commodities labeled from 6 inches up to and including 16 inches in width, take at least 2 measurements and compute the average length. The measurements should be spaced at approximately equal intervals and not be made along the edges.

   c. Timbers that are greater than 16 inches should have at least two length measurements and possibly a third if lengths vary.

MULTI-UNIT PACKAGES

Multi-Unit Packages are packages containing more than one unit of the same item.

Examples: Glue Sticks - 10 sticks, each 1/4 inch diameter, 2-1/2 inch length.
Trash Bags - 30 bags, each 28 inch wide, 8 inch deep, 32 inch long
Facial Tissues - 600 tissues, 9 inch x 14 inch

For inspection purposes, each container having multiple individual units is considered to be one package for determining the lot size. For example, the lot size for 20 packages with 10 glue sticks in each package would be 20.

The overage or shortage for each package should be calculated by averaging measurements of individual units randomly selected from the package. To determine the number of units to be selected, use the following table derived from Table 2-7, MAV column, of the sampling and testing regulation.

NUMBER OF UNITS TO BE SAMPLED

LABELED COUNT	NUMBER UNITS	LABELED COUNT	NUMBER UNITS
UP TO & INC 83	2	541 - 625	12
84 - 116	3	626 - 725	13
117 - 150	4	726 - 815	14
151 - 200	5	816 - 900	15
201 - 240	6	901 - 990	16
241 - 290	7	991 - 1075	17
291 - 345	8	1076 - 1165	18
346 - 400	9	1166 - 1250	19
401 - 465	10	1251 - 1333	20
466 - 540	11	1334 AND GREATER	1.5 % OF LABELED COUNT ROUNDED TO WHOLE NUMBER

PLYWOOD, HARDBOARD, PARTICLE BOARD, PANELING, AND SIDING

A. Equipment

1. Certified linear measure.

2. Certified Caliper or micrometer

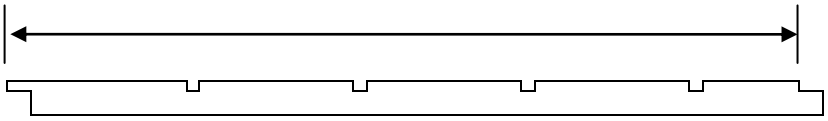
B. Notes

1. The nominal thickness is the actual or full “designated” thickness. Nominal 1/2 inch thick panel is 0.50 inch thick after any sanding or dressing.

2. Industry tolerances could be considered as being similar to maximum allowable variations. Regardless of any industry tolerance, the lot must meet the requirements for MAV’s and the average thickness when tested according to sampling and testing regulations.

3. Overlapping or interlocking panels shall be measured according to the exposed face.

MEASUREMENT



C. Procedure

1. Average at least two measurements for length and three for width. Length and width measurements should be made at least 6 inches from the edge.

2. Average at least six measurements to determine thickness. Measurements should be made at various locations keeping as far from the edges as practical.

POLYETHYLENE OTHER THAN SHEETING

For Polyethylene Sheeting, Drop Cloths, and Tarpaulins, see HB 133, page 59, 4.7.

For other plastics (polybutyl, polypropylene, polyacetate, etc.) use bidimensional procedures as appropriate. The weights of other plastics cannot be calculated using gram per square centimeter contained in polyethylene procedures.

A. Equipment

1. A deadweight dial micrometer with a flat anvil of 1/4-inch diameter or larger in area and a 3/16-inch diameter flat surface on the spindle head. This is available from the local DMS office.

2. A calibrated linear measure.

3. Scale and calibrated weights.

B. Procedure

1. Weight: All polyethylene commodities having a weight label should be tested according to weight.

2. Thickness. (All measurements are single thickness)

   a. All measurements should be made at least 3/4-inch from the edge.

   b. Bags: Six measurements uniformly spaced around the circumference; compute the average.

   c. Lay flat tubing: Six measurements uniformly spaced around the circumference; compute the average.

3. Width and length.

   a. Lay flat tubing: Three measurements along the length and ten measurements along the width; compute the averages.

   b. Bags: Three measurements along the width and length; compute the average. When measuring polyethylene bags, the measurements are the inside or “useable” dimensions, excluding the seams.

Note:

It is suggested that the tare sample be fully tested to determine if weight, dimension, count, or capacity statements are in error. For any statements found in error, the remaining samples may be tested for only those or any one of those statements found to be in error in the interest of saving time.

Computation of Weight:

If the film density in g/cm^3 is known, the following formula can verify that the weight and dimension statements on a container do not conflict. It is generally accepted that the minimum densities for polyethylene resins exceed 0.92 g/cm^3 so that any weight statement on a package which does not equal or exceed the value obtained by using .92 g/cm^3 in the formula (D = .92) would indicate the likelihood of a shortage.

Formula: M = T" x L" x W" x 0.03613 x D

M = Weight

T" = Thickness in inches (i.e., 1.75 mil = .00175 inch)

L" = Length in inches

W" = Width in inches

D = Density in g/cm^3

0.03613 = Conversion factor for density from g/cm^3 to lbs/in^3

SHOELACES

A. **Equipment**

1. Calibrated linear measure.

2. Means of applying a steady 3-ounce pull to shoelaces. The same equipment and set-up as used for testing Flexible Tubing, page 16-44, may be used.

B. **Procedure**

1. Apply steady 3-ounce pull to shoelace.

2. Measure total length, including the tips.

TEXTILES

SLEEPING BAGS, BEDDING, BLANKETS, RUGS, ETC.

A. Equipment

1. Calibrated linear measure.

2. Four 2-inch “C” clamps, or four weights.

3. Plastic drop cloth - to protect commodity from being soiled.

B. Special Note

When inspecting for length, width or area, spread the product and remove all wrinkles without stretching the material. The “C” clamps or weights are used to hold the product in place during inspection when there is only one inspector. Ruffles, fringes, etc., are considered part of the product and must be included in the measurement. Do not measure on a rounded corner. The product must meet each stated quantity (length, width and area) independently of the other.

C. Procedure

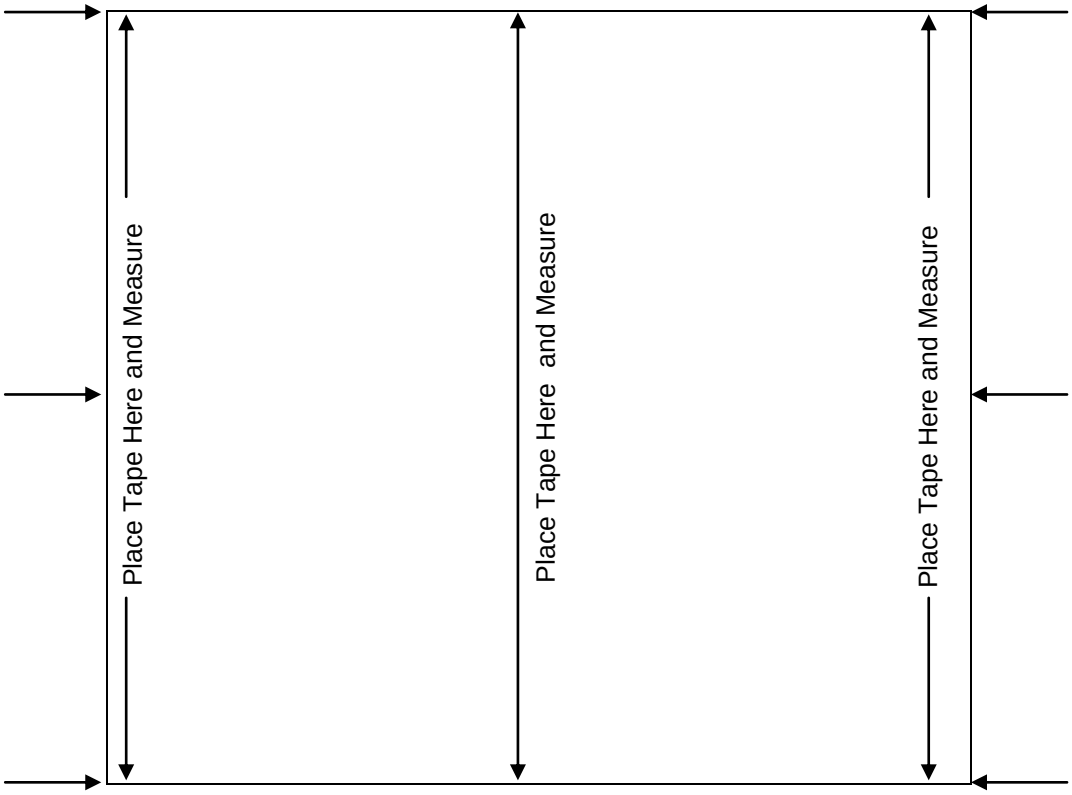
1. Remove the commodity from package and place on table or floor, making sure that adequate protection has been used so that the commodity is not soiled.

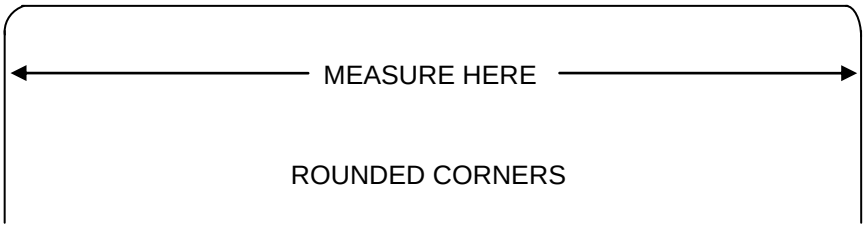
2. Remove wrinkles and secure commodity in place.

3. Take 3 measurements for length and 3 measurements for width and compute average length and average width.

4. Area = Average Length x Average Width.

MEASURING POINTS





TUBING - FLEXIBLE

A. Equipment

1. Flat surface.

2. Clamp to hold tubing at one end of tubing (see illustration).

3. Clamp and 10 lb weight to apply pull to opposite end of tubing (see illustration).

4. Calibrated linear measure.

B. Special Notes

1. Flexible tubing is tubing that will extend to a length greater than its constricted length (Example: Clothes dryer vent hose, recreational vehicle drain line hose, etc.). It is labeled to indicate the extended length.

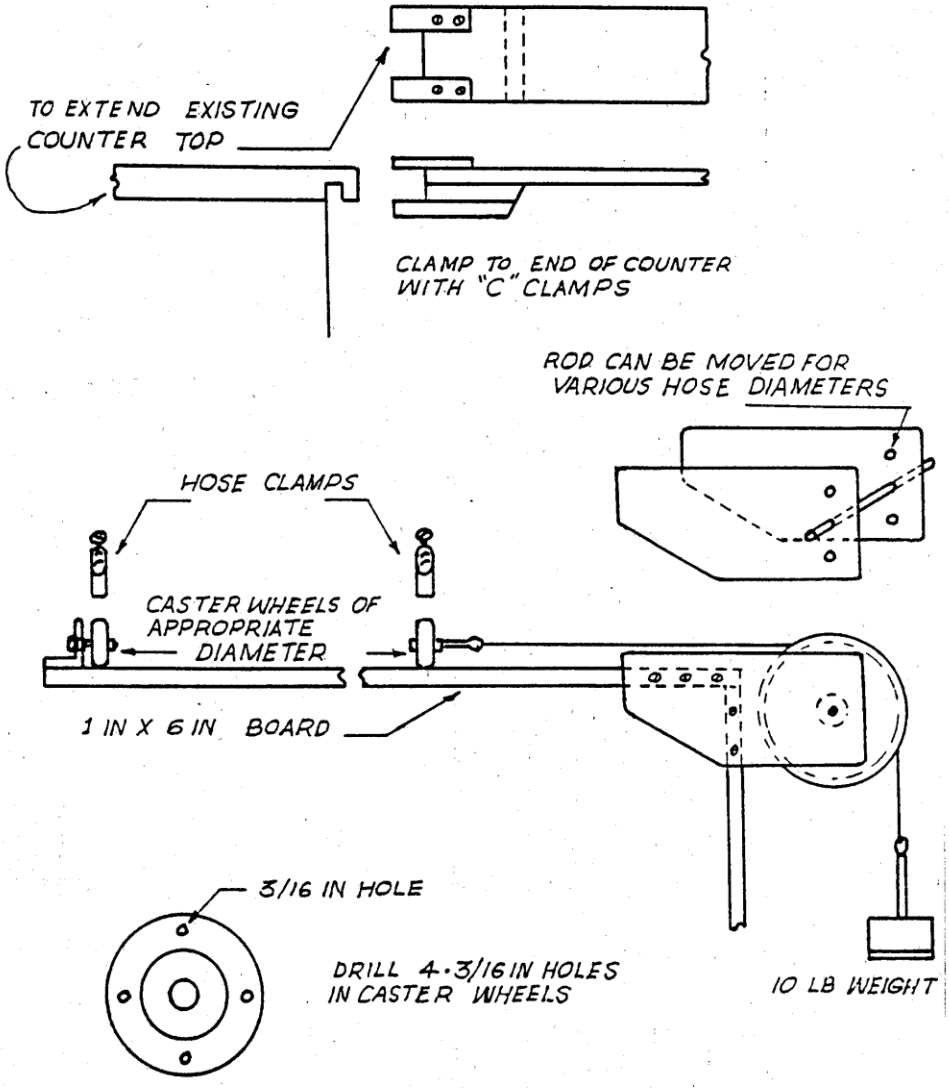
2. Other methods of applying pull to the tubing exist and may be used.

C. Procedure

1. Secure one end of tubing with clamp.

2. Apply a constant pull of ten pounds.

3. Maintain constant pull for five minutes and measure the length of the flexible tubing while maintaining constant pull.


TO EXTEND EXISTING COUNTER TOP
CLAMP TO END OF COUNTER WITH "C" CLAMPS
ROD CAN BE MOVED FOR VARIOUS HOSE DIAMETERS
HOSE CLAMPS
CASTER WHEELS OF APPROPRIATE DIAMETER
1 IN X 6 IN BOARD
3/16 IN HOLE
DRILL 4-3/16 IN HOLES IN CASTER WHEELS
10 LB WEIGHT

TURKEY: WHOLE, FROZEN

A. Equipment

1. Appropriate capacity scale and calibrated weights.

2. Calculator, optional.

3. Rubber gloves, optional.

B. Special Note

This is a destructive test procedure.

C. Procedure

1. Determine the gross weight of the turkey (i.e., without opening or removing any packaging).

2. Remove turkey from package: if present, remove temperature indicator and metal leg clip, brush or rinse off any surface ice or frost. (If rinsed, drain well.) Note the weight of the ice free bird.

3. Request the market cut the bird in half so that any cavity ice and giblet wrapping can be removed. Weigh the turkey after cutting.

4. Subtract the cut weight (3) from the whole weight (2) to determine the weight loss from cutting.

5. Remove any giblet wrap and body cavity ice. (If ice was rinsed off, drain well.) Weigh.

6. To determine the net weight, add the cutting weight loss (4) to the weight (5).

7. To determine the tare weight, subtract the net weight (6) from the gross weight (1).

WINE

VOLUMETRIC TEST PROCEDURE

A. Equipment

1. Calibrated glass graduate “To Contain”.
2. Thermometer –20°F to 120°F.
3. Corkscrew.
4. Calculator (optional).

B. Special Notes

1. For carbonated wines and champagnes, maintaining the commodity at about 40°F will simplify testing. Temperature correction is made to 68°F.
2. “To Deliver” graduates may be used if a correction factor is known for the difference between “To Deliver” and “To Contain” graduates.
3. Testing may be done by weight, according to gravimetric procedures.

C. Procedure

1. Select “To Contain” graduate for the volume of wine that you wish to test.
2. Wet graduate with wine and give a 10-second drain. This compensates for the retention in the wine bottle.
3. Pour a sample bottle into wetted graduate giving the sample a 1 minute drain, record volume to be corrected (V_o).
4. Insert the thermometer in graduate until reading stabilizes, then read temperature.
5. Wine is corrected to 68°F using a coefficient of expansion of 0.0002 per degree Fahrenheit.

6. Formula: Error = V_o [.0002 (68 - T_o) + 1] - V_L

   V_o = Observed Volume

   T_o = Actual Temperature of wine in degrees Fahrenheit

   V_L = Labeled Volume

   0.0002 = Coefficient of expansion per degree Fahrenheit

D. Examples

1. Example 1:

   Observed Volume is 746 ml
   Observed Temperature is 76°F
   Labeled Volume is 750 ml

   Utilizing the formula:

   V_o = 746 ml

   T_o = 76°F

   V_L = 750 ml

   Error = 746 ml [.0002 (68 - 76) + 1] - 750 ml = -5.19 ml

2. Example 2:

   Observed Volume is 1490 ml
   Observed Temperature is 60°F
   Labeled Volume is 1.5 L (1500 ml)

   Utilizing the formula:

   V_o = 1490 ml

   T_o = 60°F

   V_L = 1500 ml (1.5 L)

   Error = 1490 ml [.0002 (68 - 60) + 1] - 1500 ml = -7.62 ml

E. Reference: Bureau of Alcohol, Tobacco and Firearms.

[THIS PAGE INTENTIONALLY LEFT BLANK]